THAT CLAIMED IS:

1. A rotorcraft including:

a fuselage;

a rotor; and

a tilting mast including a driveshaft extending upward from the fuselage and a tilting mast frame to tilt the tilting mast relative to the fuselage, the rotor being carried by the tilting mast.

2. The rotorcraft defined in claim 1, further comprising:

a cyclic control;

a spindle mounted to the tilting mast frame for supporting the rotor and to connect the rotor to the cyclic control, the cyclic control, spindle and rotor being carried by the tilting mast; and wherein

the tilting mast frame provides input to the cyclic control.

3. The rotorcraft defined in claim 2, wherein the tilting mast frame is pivotally connected to the spindle and a first fixed location on the fuselage and the cyclic control is pivotally connected to the spindle and a second fixed location on the fuselage, separate and spaced apart from the first fixed location on the fuselage, and wherein the tilting mast frame and cyclic control tilt simultaneously.

4. The rotorcraft defined in claim 2, wherein the cyclic control includes a pair of cyclic control rods, each cyclic control rod having one end pivotally connected to a fixed location on the fuselage, the opposite end pivotally connected to a tilting component of the tilting mast frame.

5. The rotorcraft defined in claim 1, further comprising a power cylinder connected between the tilting mast frame and the fuselage to tilt the tilting mast frame along a longitudinal axis of the fuselage.

6. The rotorcraft defined in claim 5, wherein the cylinder for tilting the tilting mast frame comprises a pneumatic cylinder of sufficient volume so that a fore/aft spring rate is such that the mast fore/aft natural frequency is less than a minimum operation rotor RPM to avoid a resonance oscillation in the mast.

7. The rotorcraft defined in claim 2, wherein the cyclic control includes linkage connected to the tilting mast frame for maintaining a rotor resultant force vector through or near the aircraft center of gravity during tilting of the tilting mast.

8. The rotorcraft defined in claim 2, wherein the cyclic control includes linkage connected to the tilting mast frame and a fixed position on the fuselage such that the angular movement of the spindle is slightly less than the angular movement of the tilting mast frame.

9. The rotorcraft defined in claim 1, further comprising:

at least one wing;

an angle of attack sensor; and

a controller, responsive to the angle of attack sensor, for controlling the mast tilt at selected speeds to keep the wing at an angle of attack for a best lift-to-drag ratio.

10. The rotorcraft defined in claim 2, further comprising:

an airspeed sensor; and

a controller, responsive to the airspeed sensor, for tilting the tilting mast frame and cyclic control together to a predetermined position at selected speeds as rotor lift requirements decrease.

11. The rotorcraft defined in claim 2, further comprising:

a controller positioned to tilt the tilting mast frame and the cyclic control together during horizontal flight as necessary to keep the fuselage substantially level and to tilt the tilting mast frame and the cyclic control together during a final stage of landing in an aft angular position to keep the fuselage substantially level.

12. A rotorcraft including:

a fuselage;

a rotor;

a cyclic control for controlling rotor cyclic position including a pair of cyclic control rods, each cyclic control rod having a first end and a second end, the first end pivotally connected to a fixed location on the fuselage; and

a tilting mast including a driveshaft extending upward from the fuselage and a tilting mast frame to tilt the tilting mast and to provide input to the cyclic control, a second end of the cyclic control pivotally connected to a tilting component of the tilting mast frame, both the tilting mast frame and cyclic control positioned to tilt simultaneously relative to the fuselage.

13. The rotorcraft defined in claim 12, further comprising a power cylinder connected between the tilting mast frame and the fuselage to tilt the tilting mast frame along a longitudinal axis of the fuselage.

14. The rotorcraft defined in claim 13, wherein the cylinder for tilting the tilting mast frame comprises a pneumatic cylinder of sufficient volume so that a fore/aft spring rate is such that the

mast fore/aft natural frequency is less than a minimum operation rotor RPM to avoid a resonance oscillation in the tilting mast.

15. The rotorcraft defined in claim 12, wherein the cyclic control includes linkage connected to the tilting mast frame and a fixed position on the fuselage for maintaining the rotor resultant force vector through or near an aircraft center of gravity during tilting of the mast, and wherein the angular movement of the spindle is slightly less than the angular movement of the tilting mast frame.

16. The rotorcraft defined in claim 12, further comprising:

at least one wing;

an angle of attack sensor for sensing the angle of attack of the wing;

an airspeed sensor for sensing the airspeed of the rotorcraft; and

a controller, responsive to the angle of attack sensor and airspeed sensor, for controlling the mast tilt at selected low speeds to keep the wing at an angle of attack for a best lift-to-drag ratio, for tilting the tilting mast frame and cyclic control together to a predetermined position at selected high speeds as rotor lift requirements decrease to maintain the fuselage substantially level, and to tilt the tilting mast frame and the cyclic control together during a final stage of landing in an aft angular position to maintain the fuselage substantially level.

17. A method of flying the rotorcraft having a fuselage, a center of gravity, a rotor, a cyclic control and a tilting mast frame that carry the rotor, comprising the steps of:

(a) on takeoff, tilting forward the tilting mast frame and the cyclic control together relative to the fuselage to provide forward thrust to the rotorcraft; and

(b) during landing, tilting aft the tilting mast frame and the cyclic control together relative to the fuselageto keep the fuselage substantially level.

18. The method as defined in claim 17, wherein step (a) further includes maintaining a rotor resultant force vector of the rotor through or near the aircraft center of gravity.

19. The method as defined in claim 17, wherein the rotorcraft further comprises a spindle mounted to the tilting mast frame for supporting the rotor, and wherein steps (a) and (b) further include tilting the tilting mast frame and the cyclic control such that the angular movement of the spindle is slightly less than the angular movement of the tilting mast frame.

20. The method as defined in claim 17, wherein the cyclic control includes a pair of cyclic control rods, and wherein steps (a) and (b) further include pivoting one end of each cyclic control rod from a fixed location on the fuselage when pivoting the other end of each cyclic control rod from a tilting component of the tilting mast frame.

21. The method as defined in claim 17, wherein the rotorcraft includes at least one wing, the method further comprising the step of controlling the mast tilt at low speeds to keep the wing at an angle of attack for a best lift-to-drag ratio.

22. The method as defined in claim 17, further comprising the steps of:

providing a controller receiving an input from an angle of attack sensor; and

responsive to the angle of attack sensor, automatically controlling the mast tilt to keep the wing at an angle of attack for best lift-to-drag ratio.

23. The method as defined in claim 17, further comprising the steps of:

during high-speed cruise flight, tilting the mast frame and the cyclic control as necessary together to maintain the fuselage substantially level.